1978

ANNUAL SUMMARY

COOPERATIVE FOREST PEST ACTION PROGRAM

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COVER PICTURE

Sycamore anthracnose was widespread and severe during 1978. The initial symptoms appeared in the early spring as young leaves and shoots were killed. Entire branches remained defoliated throughout the summer.

The severity of this disease is governed by the weather conditions occurring during the two week period following leaf and shoot emergence. Cool, moist weather during this period is conducive to disease development.

GENERAL COMMENTS

The winter of 1978, even though very cold, did not cause as much damage to ornamentals as the winter of 1977.

The state experienced a severe ice storm which occurred on March 25, 1978, in the Appalachian Mountains. A more detailed report can be found later in this summary.

The gypsy moth continues to move southward and westward. An infestation was found in Loudoun County, Virginia about 250 feet from the West Virginia line in Jefferson County. A more detailed report is in the summary.

Spring defoliations were predicted to cause no damage to trees in West Virginia and observations made in late spring showed this to be true.

The eastern tent caterpillar is starting to buildup again throughout the state. Numerous nests were noted in cherry trees throughout the state.

The oak sawfly continues to have a foothold in southern West Virginia. Approximately 100,400 acres of oaks were defoliated in McDowell, Wyoming and Mercer Counties.

Brood I of the Periodical Cicada hatched this year in Pendleton, Grant and Hardy county areas in the state. Extensive flagging to trees was noted in the Brandywine and Franklin area.

The Pest Identification Laboratory logged in and answered 658 insect and disease problems in 1978. A total of 1,600 telephone calls requesting assistance or information were received during 1978.

FOREST INSECTS

Oakleaf tier (Croesia albicomana) In March, 1978, an egg survey was conducted in the Tucker, Grant, Hardy, Pendleton, Randolph, Webster, Pocahontas, and Greenbrier Counties to predict the 1978 defoliation by this insect and to see if the insect had spread from the areas previously infested. The survey indicated there would be light to no defoliation in all counties surveyed. The only areas having any insect populations were Pocahontas and Greenbrier Counties. Even here the insects were in very small numbers. The Bartow area was the only site that could possibly have any noticeable defoliation.

The oakleaf tier caused light defoliation to oaks in Raleigh County at Daniels.

Fall cankerworm (Alsophila pometaria). As predicted in April, 1978, the fall cankerworm did not cause any defoliation in the Dolly Sods, Mount Storm, or Blue Ridge Mountain areas during 1978. Survey techniques for this insect include tree banding with tanglefoot and branch sampling. These methods of detection will be used to monitor the populations of the cankerworm. The cankerworm populations are cyclic and we can expect the insect to be a problem in future years. Aerial surveys were conducted over these areas during 1978 to detect any defoliation.

Walkingstick (Diapheromera femorata). An outbreak of this insect occurred in 1978 in Mineral County and it continues to be a problem throughout Mineral, parts of Hampshire and Grant Counties. Approximately 10,000 acres of black oaks and black locusts were defoliated in Mineral County during August-September 1978. This insect seems to be increasing at an alarming rate throughout the eastern panhandle of West Virginia.

Fall webworm (Hyphantria cunea). This insect was noticeable in past years throughout West Virginia and this year the populations were subsiding. Few nests were observed in West Virginia this year and we suspect the insect has experienced a collapse.

Eastern tent caterpillar (Malacosoma americana). During the past few years this insect has been at an all time low in West Virginia. However, during 1978 the insect showed signs of increasing throughout West Virginia. During 1978 there were as many as 30 nests observed in single black cherry trees in the Kanawha Valley. We can expect this insect to be abundant for the next 4-5 years. The insect causes damage only to unsprayed fruit trees, hawthorn and wild black cherry.

Southern pine beetle (Dendroctonus frontalis). Populations of this insect collapsed in 1975 and 1976 and it is difficult now to find any specimens in West Virginia. This insect can, however, build to epidemic proportions in just a few years and will be closely monitored to determine its absence or presence.

Locust leafminer (Xenochalepus dorsalis). This insect caused heavy damage to black locust throughout West Virginia with the exception of the Allegheny Mountain region. Many of the black locust trees in the Kanawha Valley put on new leaves in late summer of 1977. These trees failed to leaf out in 1978, due probably to all the energy being expended in 1977 for the late new growth. If this condition continues to exist the black locust trees in West Virginia will become more scarce.

The pine leaf chermid (Pineus pinifoliae). This insect continues to cause damage to white pine and red spruce in the higher elevations of West Virginia. The damage caused to red spruce is in the form of a small pineapple-shaped gall which occurs on the terminal branches. This damage, though unsightly, causes little or no damage to red spruce. The attacks on white pine are confined to the insect removing sap from the branches of the tree. They can cause young white pine trees to become sickly looking and to have a yellowish color. When infestations are heavy the insect can cause the death of young white pines.

Virginia pine sawfly (Neodiprion pratti pratti). This sawfly, once a problem to hard pines in southern West Virginia did not cause any damage during 1978. We will continue to monitor this insect to see if populations are on the increase.

Gypsy moth (Lymantria dispar or Porthetria dispar). The gypsy moth continues to move south and west. In the northeast the gypsy moth defoliated 1.2 million acres in 1978. In 1977 the insect defoliated 1.6 million acres in the northeast.

The states of New York, Pennsylvania, and New Jersey bore the brunt of the defoliation with 500,046, 453,000, and 204,830 acres of defoliation respectively.

Approximately 4,000 pheromone traps were placed in West Virginia during 1978. The counties of Jefferson, Berkeley, and Morgan were trapped on a one square mile grid system. The counties of Hampshire, Mineral, Grant, Hardy, Pendleton, Pocahontas, Randolph, Tucker, Preston, Monongalia, Wetzel, Marshall, Ohio, Brooke, and Hancock were trapped on a 3 square mile grid system. Greenbrier, Monroe, Mercer, Summers, and Fayette Counties were trapped on a 9 square mile grid system. An additional 600 traps were maintained by the Department of Natural Resources, Service Foresters, State Parks, and Public Hunting and Fishing Areas.

The West Virginia Department of Agriculture, Plant Pest Control Division, USDA APHIS, and the Virginia Department of Agriculture and Commerce, placed traps on a grid in the Wilson Gap Area. This grid covered approximately 1-1/2 square miles and contained 162 traps at 500' intervals. The grid straddled the Appalachian Trail with the center about halfway between Wilson Gap and the three 1977 multiple catches. The intent was to use + disparlure in this grid, but when a delay occurred it became necessary to use the racemic lure. A total of 16 moths were caught in 13 traps, one trap had 2, and one trap had 3 male moths. Eight moths were recovered in Loudoun County, Virginia, including the multiple trap catch of 3 moths. Eight moths were recovered on the Jefferson County side of the Trail and includes the multiple catch of 2 moths.

An additional 309 traps containing racemic lure were placed along the Appalachian Trail from the north end of Wilson Gap to a radio and TV tower opposite the north end of Shannondale. One trap was placed on the trail at 250' intervals and one 250' on each side at each site for a total of 103 sites. These traps caught 20 moths in 18 traps.

The Plant Pest Control Division also maintained a grid system of traps at 800' intervals which covered about 3 square miles. A total of 155 traps were placed. These traps were originally placed with racemic lure, but were changed to the + lure when it finally arrived. Twenty-nine male moths were caught in 27 traps.

There were 122 male moths caught in 105 traps this year in West Virginia. Of this total, 67 moths were caught in Jefferson County, 45 moths in Berkeley County, 8 moths in Morgan County, 1 in Pendleton County, and 1 in Hampshire County.

Burlap Banding Survey for Gypsy Moth

The Plant Pest Control Division personnel placed 780 bands on a grid system from south of Wilson Gap to Shannondale Road. The grid contained 26 sites approximately 1,000' apart. At each site one band was placed on each of ten (10) host trees adjacent to the Appalachian Trail and then 10 trees were banded 250' on each side of the trail. The bands were put up the first week in May and observations began in late May.

On June 6, 1978, the first gypsy moth larvae was caught under a burlap band in Loudoun County, Virginia. This catch was about 500 feet from the West Virginia line and was collected by summer employee Paul Jarrett of the West Virginia Department of Agriculture, Plant Pest Control Division.

After this catch was made an additional 498 bands were placed in the vicinity of sites 3, 4, 5, and 6 in an attempt to increase the recovery rate and to delimit the apparent infestation. Subsequent recoveries were limited to the vicinity of sites 4 and 5 and totaled 33 larvae. Some of these were collected from unbanded trees under natural bark flaps. Larvae were observed as late as July 11. No larvae were found across the state line inside West Virginia.

On June 22, while working in the area, Alan Miller, Forest Entomologist, found an old egg mass on an 8-inch red maple tree in the area where the larvae had been found. Later, an additional old egg mass was found in the same general area by the Virginia Department of Agriculture and Commerce.

During egg mass surveys, conducted in the fall of 1978, one new egg mass was found in the generally infested area.

CONTROL OF GYPSY MOTH PLANNED

Plans are underway to control the spread of the gypsy moth in West Virginia and Virginia with an aerial application of the chemical Dimilin at the rate of 0.06 lbs per acre. Approximately 5,600 acres will be treated in three (3) separate blocks in Loudoun and Clarke Counties, Virginia, and Jefferson County, West Virginia. The spray program will be a cooperative endeavor between USDA, APHIS, Virginia Department of Agriculture and Commerce, and West Virginia Department of Agriculture.

SCALE INSECTS

The scale insects again led the list of submitted specimens this year. Scale insects are one of the more common insects encountered on ornamental plants, house plants, and forest trees. Injury is caused by the withdrawal of plant juices from the host by a large number of insects. Numerous plant specimens submitted were dead due to the heavy infestations by scale insects. Some of the scale insects submitted to the laboratory were: the white peach scale (Pseudaulacaspis pentagonia) found on privet, euonymus, sweet cherry, wild black cherry, shrubs, lilac, and plum in Kanawha County. The white peach scale was the most common scale reported in 1978; the cottony maple scale (Pulvinaria innumerabilis) was found on silver maple, boxelder, and other maples in Kanawha County; a scale insect (Lecanium sp.) found on maple, mulberry, boxelder, and sycamore in Kanawha County; the cottony cushion scale (Icerya pucchasi) was found on alder, maple and pine in Kanawha County; the cottony maple leaf scale (Pulvinaria acericola) found on maple in Kanawha County; a terrapin scale on maple in Grant County; magnolia scale (Neolecanium cornuparvum) found on black gum in Lincoln County.

The oystershell scale (Lepidosaphes ulmi) was found on sugar maple in Kanawha County, aspen in Berkeley County, and weeping willow in Barbour County. Pine tortoise scale was found on Scotch pine in Raleigh and Wayne Counties. Pine needle scale (Phenocaspis pinifoliae) was found on Scotch pine in Raleigh County, on white and Scotch pine in Wayne County, and on Virginia pine in Kanawha County.

APHIDS

Aphids, like scale insects, cause injury to the host by drawing juices from the host plant. Some of the more common aphids submitted this year were pine bark aphid on white pine in Kanawha County and in Wetzel County.

Generally aphids were common throughout the Kanawha Valley and could be found on various plants. The giant bark aphid (Longistigma caryae) was found on pin oak in Kanawha County. The woolly alder aphid (Prociphilus tessallatus) was found on maple in Braxton County. Woolly larch aphid (Adelges laricis) was collected in Monongalia County from larch.

Many times when aphids are abundant on plants they secrete a substance called honeydew. Bees, hornets, wasps, etc. are attracted to this honeydew and may become a problem when aphids are abundant. The honeydew also harbors a fungus called sooty mold. The sooty mold will leave a blackish or sooty appearance to the leaves when infestations are heavy.

GALL INSECTS

Gall insects, even though unsightly, seldom cause the death of host plants. The following is a partial list of gall insects that were submitted. Gall insects on Populus sp., Kanawha County; the gouty oak gall (Plagitrochus punctatus) found on pin oak in Kanawha County; a gall wasp (Cynips capillata) found causing heavy damage to ornamental white oak in Mineral County. The maple bladder gall was common throughout Kanawha County and was submitted from Gilmer County, where it was found on red maple. A gall wash, (Neuroterus cockerelli) found on oak in Kanawha County. The gouty vein gall (Dasyneura communis) found on maple in Kanawha County. The maple spindle gall (Vasates aceris-crumena) found on maple and common throughout the Kanawha Valley area.

BARK BEETLES AND WEEVILS

Very few specimens of bark beetles and weevils were submitted this year. The ones submitted were: hickory engraver beetle (Scolytus quadrispinosus) causing damage to hickory in Kanawha County. An engraver beetle (Pitoygenes sp.) found on red pine in Kanawha County. The pales weevil (Hylobius pales) found causing damage to Douglas fir and Scotch pine in Mineral County. The smaller southern engraver (Ips avulsus) found causing heavy damage to 15-year old ornamental white pine in Harrison County. The white pine weevil (Pissodes strobi) causing heavy damage to white pine plantation in Nicholas County.

SAWFLIES

Sawflies, except for the oak sawfly, were at an all time low in West Virginia this year. The ones submitted were: pine webbing sawfly on Scotch Pine in Monroe County, the red headed pine sawfly (Neodiprion lecontei) found causing heavy damage to Mugo pine in Greenbrier County.

BORERS

This year many specimens of wood borers were submitted to the laboratory for identification. Many of the specimens submitted were causing no damage to homes but were found in the house. We believe that the increased use of wood for fuel has contributed to the increase of wood borers in the home.

Many persons bring the wood into the home and the insects ultimately crawl out and invade the house. The following are just a few that were submitted during the winter months. The locust borer, painted hickory borer (several specimens), and many other insects associated with dead wood. Rhododendron borer from rhododendron in Kanawha County. The dogwood borer from dogwood in Kanawha County; the sugar maple borer (Glysobius speciosus) in sugar maple from Nicholas County. A powder post beetle from a home in Kanawha County.

OTHER INSECTS

Many other insects were recovered which did not cause significant damage to plants and a few of these are: the hickory tussock moth (Halisidota caryae) found causing light damage to ornamental white birch in Greenbrier County; found causing light damage to hickory in Kanawha County. The swallow-tail butterfly (Papilio glaucus) found feeding on mulberry in Kanawha County.

The dark tussock moth (Dasychira basiflava) was submitted from Kanawha County.

Numerous specimens of spider mites were submitted which were causing light damage to white pine, spruce, pine, and hemlock.

The forest tent caterpillar (Malacosoma disstria) caused light to moderate damage to one acre of red and white oaks in Putnam County. Also, they were found causing light damage to hardwoods on the Appalachian Trail in Jefferson County.

The bagworm (Thyridopteryx ephemeraeformis) seems to be very common this year in the Kanawha Valley area. Specimens submitted were found feeding on arborvitae, spruce, sycamore and pine.

The poplar tent maker (Icthyura inclusa) was found to be feeding on Populus sp. in Kanawha County.

The elm leaf beetle (Pyrrhalta luteola) was common in the Kanawha Valley area and caused heavy damage to elms. There were six specimens submitted from Kanawha County.

This year the telephone calls asking for help were more than in any previous year. More calls were received concerning wasps, hornets and yellow jackets than in previous years. Second place went to fleas; third to ants; fourth to eastern tent caterpillar; fifth to carpenter bees; sixth, white flies; seventh, roaches and pantry pests; eighth, aphids; and ninth to spider mites. The telephone calls ranged from 80 calls on hornets, wasps, yellow jackets to 20 calls on spider mites.

PATHOLOGY SECTION

Dutch elm disease (Ceratocystis ulmi). Dutch elm disease incidence was quite high during 1978. Numerous phone calls and written requests were answered in the Pest Identification Laboratory.

To date no West Virginia cities have instituted a Dutch Elm Disease Control Program. For many cities it is now too late to begin control because disease incidence is just too great.

Armillaria root rot (Armillaria mellea). Armillaria root rot was observed in numerous wood lots and ornamental plantings. Trees attacked by this fungus had been predisposed by abiotic agents.

Black knot of cherry (Dibotryon morbosum). Black knot continues to be a problem in some forest stands and home orchard plantings. The disease is characterized by the presence of elongated black swellings on stems and branches.

In forest situations, heavily cankered trees and trees with main stem cankers should be harvested during improvement cuts.

Chestnut blight (Endothia parasitica). Each year trees are evaluated for use in the American chestnut breeding project. As the most promising trees are located, they will be added to our program. Presently over 40 promising American chestnut trees displaying blight resistance have been located in West Virginia. Each year we receive numerous reports of resistant trees: however, these trees invariably turn out to be Chinese or Japanese chestnut.

The forest pathologist and other Division personnel assisted West Virginia University researchers with establishing Endothia parasitica hypovirulence study plots. Hypovirulent isolates were inoculated onto chestnut blight cankers. The inoculation sites are being monitored to determine if natural spread of the hypovirulent strain occurs.

Cytospera canker (Cytospera kunzei). Cytospera canker has been observed on Norway spruce around the state. This disease has caused extensive damage to individual trees. However, only a few trees are involved at any one site.

Atropellis canker (Atropellis tingens). This disease caused moderate damage in two (2) six-acre plantations in Raleigh and Mercer Counties and one (1) two-acre plantation in Berkeley County.

As in the past, numerous cankers were observed on small branches throughout the tree. No main stem cankers were noted.

Fire blight (Erwinia amylovora). Very few fire blight specimens were submitted to the Pest Identification Laboratory during 1978. These was an obvious decline in disease incidence from the epiphytotic conditions of 1977.

Diplodia tip blight (Diplodia pini). Diplodia tip blight has been noted on red and Austrian pine throughout the state. This disease is generally limited to a few pines at any one location.

Lophodermium needlecast (Lophodermium pinastri). Lophodermium needlecast incidence increased during 1978. The increase in disease incidence can be correlated with three factors. The climatic conditions during the late summer and early fall of 1977 were conducive to infection. Growers are continuing to use Scotch pine strains that are less resistant to Lophodermium infection. Furthermore, growers had not been affected by the Lophodermium problem for several years. Therefore, they failed to apply the proper protective sprays.

Swiss needlecast (Phaeocryptopus gaumanni). This disease was observed causing defoliation problems in a three-acre Douglas fir plantation in Mercer County.

Initially, the trees appeared chlorotic with some of the needles turning brown. Examination of the needle undersurface revealed numerous tiny black perithecia protruding from the stomata on each side of the midrib.

Frazier fir needlecast. One diseased Frazier fir was found in a Christmas tree planting in Raleigh County. The symptoms exhibited by the plant indicate that we are dealing with a needlecast caused by the fungus Bifusella faullii. However, the spores found in the fruiting structures on the needle were atypical. An effort will be made to positively identify the causal organism.

Cedar apple rust (Gymnosporangium juniperi-virginianae). Cedar apple rust incidence was very high during the spring of 1978. Three factors were responsible for the high incidence rate. Landowners have failed to remove eastern red cedar trees from their property. Landowners have also failed to apply the necessary protective sprays. Finally, the moist spring of 1978 was conducive to cedar apple rust infection.

Western gall rust (Peridermium harknessii). The presence of western gall rust has still not been confirmed in West Virginia. However, as soon as actively sporulating galls are located the determination will be made.

Anthracnose of hardwoods (Gnomonia sp., Guignardia sp., and others). Sycamore anthracnose (Gnomonia platani) was widespread and severe during 1978. Some trees were completely defoliated. They also suffered extensive shoot and stem dieback. Due to the severity of the disease, some mortality is expected.

Sycamore anthracnose severity is governed by the weather conditions occurring during the two week period following leaf and shoot emergence. The cool, moist weather encountered during the spring of 1978 was conducive to infection and disease development.

Actinopelte leafspot (Actinopelte dryina). Actinopelte leafspot was observed on several red oaks in an ornamental planting in Kanawha County. The damage was very conspicuous during late summer. No dieback or mortality is anticipated.

Winter damage. Winter burn damage was observed in numerous ornamental plantings. Trees and shrubbery most commonly affected include holly, boxwood, and southern magnolia. Fewer plants were killed in 1978 due to winter injury than in 1977.

Ice damage. March 25, 1978 a severe ice storm hit the Appalachian Mountains in West Virginia, causing extensive damage to approximately 25,000 acres of timber. Most of the damage was concentrated on northern and eastern mountain slopes at elevations above 3,000 feet. Heavy-crowned, multiple-stemmed and forked trees proved most susceptible to damage.

The total volume of timber destroyed is not known, but could be as high as 200 million board feet. Approximately 25 million board feet of salvageable timber are located in the Monongahela National Forest. Efforts are now underway to begin salvage operations.

Herbicide misapplication. Complaints concerning herbicide misapplication continue to be a common problem submitted to the Pest Identification Lab. Many of the complaints received in the lab are due mostly to the homeowners failure to read the label. However, each year more and more complaints are received concerning vandalism involving herbicides. This type of vandalism commonly results from neighborhood disputes.

Oak Wilt Detection and Control. Due to funding problems, no oak wilt control program was conducted during 1978. Hopefully, in the future, money will be budgeted for this program.

White pine root decline (Verticladiella procera). The white pine root decline survey was continued during the 1978 growing season. Diseased trees have now been found in Mason, Tyler, Jefferson, Greenbrier, Summers, Tucker, Pocahontas, Pleasants, Jackson, Wood, Randolph, Mercer and Wayne Counties. Undoubtedly this disease occurs in other counties.

White Pine Blister Rust (Cronartium ribicola). For the year 1978, 13,447 Ribes plants were destroyed on 2,080 acres of land. In addition to direct control activities, 20,295 acres were surveyed in detection, pre-suppression and post control surveys.

A total of 10,148 acres of the control area was placed in a "no further work" category due to Ribes and pine conditions. This brings the total acreage of state and private land in West Virginia that will need no further work to 331,807 acres of a total of 414,283.

SUMMARY OF 1977-78 GYPSY MOTH [Lymantria dispar (L.)] BIOLOGICAL CONTROL PROGRAM ACTIVITIES

Charles C. Coffman, Entomologist

Introduction

This report summarizes both 1977 and '78 activities, since the last report issued was for 1976. The emphasis during this two-year period was on field projects.

Brachymeria intermedia (Nees) Establishment

We have succeeded in establishing B. intermedia at one location and have evidence of survival and reproduction for at least one season in a second location. An adult male [confirmed by E. E. Grissell, USDA, Systematic Entomology Laboratory (SEL)] was recovered from an unknown pupa collected from a burlap band on white oak near Allensville, Berkeley County, by P. VanBuskirk on July 22, 1976. Establishment apparently occurred from releases made 2¼ air miles away near Johnsontown, Berkeley County (1972 L. dispar trap catch site) on May 17, 1973 (1,000 individuals) and/or June 21, 1973 (1,000 individuals). This is the first record of establishment of B. intermedia on an alternate host population.

An opinion given by D. M. Weisman (SEL) placed the unknown pupa, with attached larval skin, near Xylomiges sp. (Noctuidae: Hadeninae). Subsequent field work in 1977 and '78 and overwinter rearing of collected pupae has since shown this host to be Allotria elonympha Hubner (Noctuidae: Catocalinae). This was recently confirmed by D. M. Weisman and D. C. Ferguson (SEL).

A second adult male (also confirmed by E. E. Grissell) was recovered from a pupa of what is believed to be Bomolocha baltimoralis Guenee (Noctuidae: Hypeninae). This pupa was collected by B. Northeimer from a burlap band on white oak at our Fort Run site in Hardy County on August 10, 1976. The last release of Brachymeria intermedia at this site was September 11, 1975 (7,000 individuals), so overwintering and subsequent ovipositing did occur. This site was also a 1972 gypsy moth trap catch site and releases there go back to May 16, 1973.

The host association for this second male was made by identifying an adult moth that emerged from an identical pupa collected at the same site on the same date.

The biological significance of these establishments pales considerably as B. intermedia continues to manifest itself in, primarily, high density gypsy moth populations (M. Ticehurst, pers. comm.). It has never been observed, as yet, to be of significance in low density populations and, therefore, would render little help in suppressing populations initially.

Brachymeria intermedia Recovery Efforts Through Malaise Trapping and Burlap Banding

An intensive effort was made during the 1977 summer season to solidify the above observations with additional recoveries. Using 60 (double the number used at other sites) burlap banded host trees at each site, 106 and 102 pupae were collected at Allensville and Fort Run, respectively. At Allensville, 50 of the 106 were believed to be Allotria elonympha; but at Fort Run, not a single Bomolocha baltimoralis pupa was among the 102 collected. No recoveries of Brachymeria intermedia were made from this effort.[1]

In addition to doubling the number of burlap bands at Allensville and Fort Run, one ground and three aerial Malaise traps were used at the former site and one ground and four aerial at the latter. All of the aerial traps at Allensville had two 2' high X 4' wide interception panels set at right angles and they were arranged to sample two-foot intervals beginning at 6' and ending at 12' above ground level. Three of the aerial traps used at Fort Run were the same as those used at Allensville and were arranged to sample the 5-7', 8-10' and 11-13' intervals above ground. The fourth aerial trap used at Fort Run was a larger (3' X 6' panels) ground trap that was modified for aerial use and set to sample 5-8' off the ground. In spite of all this effort, there were no B. intermedia recovered from any of these traps. Interestingly, a single B. ovata (a native species recovered in previous years) male was taken on July 7, 1977 at Fort Run in the trap set at 11'. Based on comments by Burks (1960) and our own recovery experiences, this species apparently occupies a niche similar to B. intermedia.

Four other previous B. intermedia release sites were also monitored in 1977 with 30 burlap bands each and 2-5 Malaise traps. These were Capon Bridge, Grace, and Romney in Hampshire County and Fisher in Hardy County. As with the other two sites, there were no B. intermedia recovered.

[1]From B. intermedia's past history in low density gypsy moth populations (difficult to recover) and our own recent experiences, it appears that low alternate host populations in our situation have been significantly more of an obstacle to recovering it than to establishing it.

Continuation of Malaise Trapping and Burlap Banding for General Survey Purposes

Four field sites were monitored in 1978. Three were new (Greenland, Grant Co.; Cherry Run, Morgan Co.; and Shannondale, Jefferson Co.) and one (Grace, Hampshire Co.) was retained from 1977. The three new ones provided us with complete coverage of the Eastern Panhandle. All sites were set up with 30 burlap bands and one ground Malaise trap and were monitored weekly from late May through August.

We have now amassed a significant collection of Coleoptera, Lepidoptera, Diptera, and Hymenoptera from a nine-county area using these two survey techniques. Our primary interest in this collection is the large number of parasitic Diptera and Hymenoptera, but it has contributed immensely to our general survey of the insects of West Virginia. Separate detailed reports will be issued on both the Malaise trapping and burlap banding surveys at a later date.

Other Documentation of Potential Parasite Alternate Hosts

In a continuing effort to identify the total range of potential alternate hosts for gypsy moth parasites in the eight-county Eastern Panhandle area, a list of 127 Lepidoptera species records, from the WVDA Reference Collection, for that area, was compiled for future reference.

The Early Instar Larval Parasite Apanteles liparidis (Bouche)

Based on its performance in Europe, it is generally believed that Apanteles liparidis would be a more successful parasite of early instar gypsy moth larvae than A. melanoscelus has been. Attempts to establish it in infested states have been unsuccessful due, apparently, to lack of a suitable alternate host. In Europe it overwinters as an immature in larvae of Dendrolimus pini (Lasiocampidae) and it was recently discovered to be utilizing a species of Dendrolimus for overwintering in Japan (J. R. Coulson, pers. comm.).

The genus Dendrolimus does not occur in this country, nor are there any lasiocampids, as far as is known (D. M. Weisman, pers. comm.), that overwinter as larvae that might serve as substitutes. However, we do have several species of lymantriids in the genus Dasychira that overwinter as larvae and might serve as substitute overwintering hosts. We also have at least one other lymantriid that might serve as a substitute for gypsy moth itself and that is the whitemarked tussock moth, Orgyia leucostigma (J. E. Smith).

Apanteles liparidis was first released in West Virginia in 1976. In 1977, an attempt was made to time releases more precisely to the presence of appropriate potential host stages, based on the knowledge we were acquiring about their seasonal history. However, this was only partially successful as the second parasite shipment was delayed and that release was made two weeks late.

Evaluation of these releases was limited to Malaise trap collections and identification of those is far from complete. Obviously, Malaise trap collecting is not the most desirable evaluation technique due to its general nature, but it was selected as a compromise in support of our desire to undertake a broad survey for native parasitic species.

The only study to investigate potential alternate hosts for A. liparidis was done by Raffa (1976). However, in most cases, he had very few host larvae to work with. Consider the following species of Lymantriidae: 1 Hemerocampa definita Packard, 4 Orgyia leucostigma (J. E. Smith), and 10 Dasychira basiflava (Packard). More extensive testing is needed on the more promising of these species to adequately assess their potential. In view of this, a cooperative field cage study was initiated in August, 1977 with Dr. Robert Schroder (AR, SEA, USDA) to determine the suitability of Dasychira meridionalis Barnes & McDunnough as an overwintering host for A. liparidis. Based on our burlap band survey, D. meridionalis is the most abundant of four species of this genus in the Eastern Panhandle area and relatively easy to collect as larvae.

The study's progress was marred by the field cage's collapse under the unusually heavy snows in January, 1978. Following this experience, the approach to the objectives was reevaluated and the study's initial phase was shifted to a laboratory environment. A separate report will be issued on this project when it is completed.

The Climbing Cutworm Polia latex (Guenee)

A second cooperative study with Dr. Schroder was initiated in August, 1977 on the life cycle and seasonal distribution of Polia latex. The study is being conducted for three reasons: (1) although very little is known of this species in its natural habitat, it has been determined through our burlap band survey to be the most abundant leaf feeder on our major oak species during the summer in the Eastern Panhandle; (2) even though it has never been an economic pest, it could become an important late season defoliator in areas refoliating from early season gypsy moth feeding; and (3) from the standpoint of abundance, it has potential as a readily available alternate host for polyphagous gypsy moth parasites.

All of the study objectives were not met during the ensuing year and the study is still in progress. A separate report will also be issued on this project when it is completed.

Future Biocontrol

The future of biological control in the overall pest management plan for gypsy moth received a boost in 1978 based on reports coming out of Pennsylvania. James O. Nichols, Chief of the Division of Forest Pest Management in Pennsylvania's Department of Environmental Resources, talked about the success of gypsy moth parasites bringing about the collapse of populations over large areas of the Keystone State in 1978, in his address at the Southeastern Forest Insect Work Conference. Detailed summaries of the observations made in Pennsylvania this past season are given in Nichols (1978 a, b; unpub. reps.).

The principal parasites figuring in population collapses were two tachinid flies, Parasetigena silvestris (Robineau-Desvoidy) and Blepharipa pratensis (Meigen). Parasitism by the former in many areas went as high as 87% and averaged over 50%. In collapsed areas, total parasitism exceeded 95% indicating a significant rise in other species as well and made these biological collapses as effective as spraying.

Hopefully, Pennsylvania's experience in 1978 is not temporary, but rather an indication that, as Nichols (1978 a, unpub. rep.). says, "the problem may be kept within manageable levels without facing an uncontrollable situation year after year."

In addition to the increase in parasite activity over much of Pennsylvania, the nuclear polyhedrosis virus (NPV) has been registered with EPA by the U. S. Forest Service and is available for use. Also, advances have been made with the pheromone that have improved not only the results being achieved in mating disruption experiments, but survey and detection as well.

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